Claims

What is claimed is:

1. A method of assessing a physiological function detectable in an arm and a hand of an individual, comprising the steps of:

   (a) applying a stimulus proximal to a wrist of an individual, whereby application of said stimulus stimulates a nerve that traverses said wrist and thereby generates an impulse that is conducted by said nerve;

   (b) detecting a myoelectric potential proximal to said wrist of said individual, whereby said myoelectric potential is generated by a muscle in said hand of said individual in response to said impulse, said muscle being in communication with said nerve and said impulse being conducted to said muscle after propagation of said impulse through a spinal cord of said individual;

   (c) processing said stimulus and said myoelectric potential; and

   (d) correlating said processing results to a physiological function of a peripheral nervous system of said individual.

2. The method of claim 1, further comprising the step of removing a trend from a baseline of said myoelectric potential.

3. The method of claim 2, wherein said removing step comprises the steps of:

   (a) determining a straight line fit of said myoelectric potential; and

   (b) subtracting said straight line from said myoelectric potential.

4. The method of claim 2, wherein said removing step comprises the steps of:

(a) detecting a plurality of myoelectric potentials;

(b) averaging said plurality of myoelectric potentials; and

(c) subtracting said average from each of said plurality of myoelectric potentials.

5. The method of claim 4, further comprising the steps of:

(a) determining a first derivative for each of said myoelectric potentials, thereby to obtain a plurality of first derivatives;

(b) determining a mean of said plurality of first derivatives;

(c) determining a statistical distribution of said plurality of first derivatives; and

(d) removing from said plurality of myoelectric potentials that are averaged in step (b) of claim 4 any segment of a myoelectric potential of said plurality of myoelectric potentials that has a first derivative removed by a predetermined factor from said mean of said derivatives.

6. The method of claim 1, further comprising the step of filtering said myoelectric potential.

7. The method of claim 6, wherein said filtering step comprises digitally filtering said myoelectric potential.

8. The method of claim 1, wherein said physiological function comprises a F-wave latency between application of said stimulus and detection of said myoelectric potential and wherein said processing step further comprises the step of determining said F-wave latency and said correlating step further comprises the step of producing an indicia of said F-wave latency.

9. The method of claim 8, wherein said step of determining a F-wave latency comprises the steps of:

(a) detecting an F-wave response signal in said myoelectric potential;

(b) determining a maximum peak of said F-wave response signal;

(c) identifying a first minimum peak and a second minimum peak of said F-wave response signal, both of said first and second minimum peaks being adjacent said maximum peak of said F-wave response signal;

(e) determining an amplitude of said maximum peak of said F-wave response signal to one of said first and second minimum peaks of said F-wave response signal;

(f) determining a noise dependent threshold;

(g) comparing said amplitude to said noise dependent threshold; and

(h) determining a F-wave latency when said amplitude is greater than or equal to said noise dependent threshold.

10. The method of claim 9, wherein said step of determining a maximum peak of said F-wave response signal comprises determining a portion of said myoelectric potential for which a first derivative of said myoelectric potential is equal to zero.

11. The method of claim 9, wherein said step of identifying first and second minimum peaks of said F-wave response signal comprises determining a portion of said myoelectric potential for which a first derivative of said myoelectric potential is equal to zero.

12. The method of claim 9, wherein said step of determining a noise dependent threshold comprises the steps of:

(a) determining a level of noise after detecting said myoelectric potential; and

(b) multiplying said level of noise by a predetermined factor.

13. The method of claim 9, wherein said step of determining a noise dependent threshold, comprises the steps of:

(a) determining a level of noise before detecting said myoelectric potential; and

(b) multiplying said level of noise by a predetermined factor.

14. The method of claim 9, wherein said step of determining a F-wave latency comprises the step of identifying an inflection of said myoelectric potential, said inflection preceding said maximum peak of said F-wave response signal.

15. The method of claim 14, wherein said inflection comprises a point on said myoelectric potential having a first derivative less than or equal to zero.

16. The method of claim 14, wherein said inflection comprises a minimum peak of a first derivative of said myoelectric potential.

17. The method of claim 9, further comprising the step of processing atypical waveform shapes in said F-wave response signal.

18. The method of claim 17, wherein said step of processing atypical waveform shapes comprises the steps of:

(a) determining a location of a minimum peak of said F-wave response signal;

(b) inverting said F-wave response signal; and

(c) assigning a maximum peak of said inverted F-wave response signal to said location of said minimum peak of said F-wave response signal.

19. The method of claim 9, further comprising the step of confirming said F-wave latency.

20. The method of claim 19, wherein said step of confirming said F-wave latency comprises the steps of:

(a) determining a first derivative of said myoelectric potential at a plurality of points within a first time period preceding said F-wave latency, thereby obtaining a plurality of first derivatives within said first time period;

(b) averaging said plurality of first derivatives within said first time period; and

(c) comparing said average with a maximum peak and a minimum peak of said F-wave response signal in a second time period following said F-wave latency.

21. The method of claim 19, wherein said step of confirming said F-wave latency comprises the steps of:

(a) identifying a maximum or minimum peak in said myoelectric potential at a point of said myoelectric potential that precedes said F-wave latency; and

(b) comparing said identified peak to said maximum peak of said F-wave response signal.

22. The method of claim 8, further comprising the step of indicating said F-wave latency in response to said indicia.

23. The method of claim 8, further comprising the step of producing a signal indicative of a peripheral nervous system disorder in response to said F-wave latency.

24. The method of claim 23, further comprising the step of indicating a peripheral nervous system disorder in response to said signal.

25. The method of claim 8, further comprising the steps of measuring a skin temperature of said arm of said individual and modifying said F-wave latency in response thereto.

26. The method of claim 8, further comprising the steps of determining a height of said individual and modifying said F-wave latency in response thereto.

27. The method of claim 8, further comprising the steps of determining an age of said individual and modifying said F-wave latency in response thereto.

28. A method of assessing a physiological function of a leg and a foot of an individual, comprising the steps of:

(a) applying a stimulus proximal to an ankle joint of an individual, whereby application of said stimulus stimulates a nerve that traverses said ankle joint and thereby generates an impulse that is conducted by said nerve;

(b) detecting a myoelectric potential proximal to said ankle joint of said individual, whereby said myoelectric potential is generated by a muscle in said foot of said individual in response to said impulse, said muscle being in communication with said nerve and said impulse being conducted to said muscle after propagation of said impulse through a spinal cord of said individual;

(c) processing said stimulus and said myoelectric potential; and

(d) correlating said processing results to a physiological function of a peripheral nervous system of said individual.

29. The method of claim 28, further comprising the step of removing a trend from a baseline of said myoelectric potential.

30. The method of claim 29, wherein said removing step comprises the steps of:

(a) determining a straight line fit of said myoelectric potential; and

(b) subtracting said straight line from said myoelectric potential.

31. The method of claim 29, wherein said removing step comprises the steps of:

(a) detecting a plurality of myoelectric potentials;

(b) averaging said plurality of myoelectric potentials; and

(c) subtracting said average from each of said plurality of myoelectric potentials.

32. The method of claim 31, further comprising the steps of:

(a) determining a first derivative for each of said myoelectric potentials, thereby to obtain a plurality of first derivatives;

(b) determining a mean of said plurality of first derivatives;

(c) determining a statistical distribution of said plurality of first derivatives; and

(d) removing from said plurality of myoelectric potentials that are averaged in step (b) of claim 31 any segment of a myoelectric potential of said plurality of myoelectric potentials that has a first derivative removed by a predetermined factor from said mean of said derivatives.

33. The method of claim 28, further comprising the step of filtering said myoelectric potential.

34. The method of claim 33, wherein said filtering step comprises digitally filtering said myoelectric potential.

35. The method of claim 28, wherein said physiological function comprises a F-wave latency between application of said stimulus and detection of said myoelectric potential and wherein said processing step further comprises the step of determining said F-wave latency and said correlating step further comprises the step of producing an indicia of said F-wave latency.

36. The method of claim 35, wherein said step of determining a F-wave latency comprises the steps of:

(a) detecting an F-wave response signal in said myoelectric potential;

(b) determining a maximum peak of said F-wave response signal;

(c) identifying a first minimum peak and a second minimum peak of said F-wave response signal, both of said first and second minimum peaks being adjacent said maximum peak of said F-wave response signal;

(e) determining an amplitude of said maximum peak of said F-wave response signal to one of said first and second minimum peaks of said F-wave response signal;

(f) determining a noise dependent threshold;

(g) comparing said amplitude to said noise dependent threshold; and

(h) determining a F-wave latency when said amplitude is greater than or equal to said noise dependent threshold.

37. The method of claim 36, wherein said step of determining a maximum peak of said F-wave response signal comprises determining a portion of said myoelectric potential for which a first derivative of said myoelectric potential is equal to zero.

38. The method of claim 36, wherein said step of identifying first and second minimum peaks of said F-wave response signal comprises determining a portion

of said myoelectric potential for which a first derivative of said myoelectric potential is equal to zero.

39. The method of claim 36, wherein said step of determining a noise dependent threshold comprises the steps of:

(a) determining a level of noise after detecting said myoelectric potential; and

(b) multiplying said level of noise by a predetermined factor.

40. The method of claim 36, wherein said step of determining a noise dependent threshold, comprises the steps of:

(a) determining a level of noise before detecting said myoelectric potential; and

(b) multiplying said level of noise by a predetermined factor.

41. The method of claim 36, wherein said step of determining a F-wave latency comprises the step of identifying an inflection of said myoelectric potential, said inflection preceding said maximum peak of said F-wave response signal.

42. The method of claim 41, wherein said inflection comprises a point on said myoelectric potential having a first derivative less than or equal to zero.

43. The method of claim 41, wherein said inflection comprises a minimum peak of a first derivative of said myoelectric potential.

44. The method of claim 36, further comprising the step of processing atypical waveform shapes in said F-wave response signal.

45. The method of claim 44, wherein said step of processing atypical waveform shapes comprises the steps of:

(a) determining a location of a minimum peak of said F-wave response signal;

(b) inverting said F-wave response signal; and

(c) assigning a maximum peak of said inverted F-wave response signal to said location of said minimum peak of said F-wave response signal.

46. The method of claim 36, further comprising the step of confirming said F-wave latency.

47. The method of claim 46, wherein said step of confirming said F-wave latency comprises the steps of:

(a) determining a first derivative of said myoelectric potential at a plurality of points within a first time period preceding said F-wave latency, thereby obtaining a plurality of first derivatives within said first time period;

(b) averaging said plurality of first derivatives within said first time period; and

(c) comparing said average with a maximum peak and a minimum peak of said F-wave response signal in a second time period following said F-wave latency.

48. The method of claim 46, wherein said step of confirming said F-wave latency comprises the steps of:

(a) identifying a maximum or minimum peak in said myoelectric potential at a point of said myoelectric potential that precedes said F-wave latency; and

(b) comparing said identified peak to said maximum peak of said F-wave response signal.

49. The method of claim 35, further comprising the step of indicating said F-wave latency in response to said indicia.

50. The method of claim 35, further comprising the step of producing a signal indicative of the presence or absence of diabetic neuropathy in response to said F-wave latency.

51. The method of claim 50, further comprising the step of indicating the presence or absence of diabetic neuropathy in response to said signal.

52. The method of claim 35, further comprising the steps of measuring a skin temperature of said leg of said individual and modifying said F-wave latency in response thereto.

53. The method of claim 35, further comprising the steps of determining a height of said individual and modifying said F-wave latency in response thereto.

54. The method of claim 35, further comprising the steps of determining an age of said individual and modifying said F-wave latency in response thereto.